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EXAMINER

DEO, DUY VU

ART UNIT	PAPER NUMBER
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1765

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DATE MAILED: 08 26 2002

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/826,674

Applicant(s)

CHADDA ET AL.

Examiner

DuyVu n Deo

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 12 July 2002.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-36 and 52-102 is/are pending in the application.
- 4a) Of the above claim(s) 37-51 and 103-143 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-36 and 52-102 is/are rejected.
- 7) ☒ Claim(s) 77 and 102 is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
  2. ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- \* See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4
- 4) ☐ Interview Summary (PTO-413) Paper No(s) \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other.

## DETAILED ACTION

### *Election/Restrictions*

1. Applicant's election without traverse of claims 1-36, 53-102 in Paper No. 6 is acknowledged.

### *Claim Rejections - 35 USC § 112*

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claims 1, 24, are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The limitation "said abrasive step is a rate-determining step of said removal mechanism" is vague and indefinite because it is unclear how the rate is determined from the abrasive step and how are the abrasive step and removal mechanism related to the steps of "causing the work piece to contact...polishing member," "causing a polishing solution...polishing member," and "establishing a temperature...contact area." At this time the abrasive step is understood as "causing the work piece to contact a polishing member while effecting relative motion between the work piece and the polishing member."

4. Claims 6, 7, 28, 29 recite the limitation "polishing surface." There is insufficient antecedent basis for this limitation in the claim.

***Claim Objections***

5. Claims 77, 102 are objected to under 37 CFR 1.75(c), as being of improper dependent form for failing to further limit the subject matter of a previous claim. Applicant is required to cancel the claim(s), or amend the claim(s) to place the claim(s) in proper dependent form, or rewrite the claim(s) in independent form. Claim 77 depends on claim 76 but it is the same as claim 76. This is the same for claim 102.

***Drawings***

6. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: pages 15, 16 describes references #410, 430, 490, 500, which are not found in figure 4. A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 102***

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

8. Claims 1, 11, 21, 24, 52, 62, 75, 78, 88 are rejected under 35 U.S.C. 102(b) as being anticipated by Kondo et al. (JP 11-135466).

US patent 6,117,775 is considered as the correct translation of JP patent 11-135466 and is used here for the rejection. A translation will be provided upon applicant's request.

Kondo teaches a polishing method for removing a metal surface wherein the metal surface is oxidized to form a thin removable oxide film (claimed kinetic removal mechanism for removal of the metal surface is characterized by a formation step for formation of a removable surface film) comprising: causing a wafer to contact a polishing pad and rotating the wafer and the pad (claimed abrasive step or causing work piece to contact a polishing member while effecting relative motion between them), supplying a slurry having less than 1 wt% of polishing abrasive between the wafer and the pad (col. 6, line 5-16, line 57-68; col. 11, line 60-col. 12, line 3). Since above method comprises the same step as that of the claim, the abrasive step would have a rate associating with and therefore it would also be a rate-determining step of the removal mechanism.

Referring to claim 24, the friction between the wafer and the polishing member (claimed contact area) while rotating would establish a T at the contact area while polishing or distributing the slurry.

Referring to claims 52 and 78, the metal to be polished is Cu (col. 6, line 19) and down force is 220 g/cm<sup>2</sup> or 3.13 psi (claimed low-down force pressure). The rate of removal of Cu surface would have to be approximately proportional to the contact pressure since a higher P would increase polishing rate and a lower P would slow down polishing rate.

***Claim Rejections - 35 USC § 103***

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

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(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

10. Claims 2, 4, 28, 30, 53, 55, 79, 81 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo as applied to claims 1, 24, 52, 78 above, and further in view of Beardsley et al. (US 6,135,865).

Unlike claimed invention, Kondo doesn't describe supplying slurry through a plurality of pores in the pad and through at least one pore in the platen connected to the pad. Beardsley teaches a CMP apparatus wherein he teaches supplying the slurry through a porous pad and through holes formed in the platen connected to the pad (claimed at least one pore formed in the platen) (col. 3, line 55-63; col. 5, line 50-68; figure 4, 5). it would have been obvious for one skilled in the art to modify Kondo's method in light of Beardsley's slurry distributing system because Beardsley teaches that this slurry distributing system is inexpensive and uncomplicated and would distributing slurry more uniformly on the pad to have an uniform polishing action (col. 1, line 54-col. 2, line 13).

11. Claims 3, 5, 29, 31, 54, 56, 80, 82 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo as applied to claims 1, 24, 52, 78 above, and further in view of Sato (US 5,246,525).

Unlike claimed invention, Kondo doesn't describe supplying slurry through channel formed in the pad and through at least one pore, which formed in a platen and collinear with the channel. Sato describes a polishing apparatus wherein he teaches supplying the slurry through

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channel 4 formed in the pad and pore 4, formed in the platen and collinear with the channel 4 (figure 1b, 2b, 3b). it would have been obvious to modify Kondo's method in light of Sato's slurry distributing system because Sato shows that slurry can be distributed uniformly on the pad and therefore, would help the polishing of the wafer is more uniform to provide a flat surface (col. 2, line 50-65; summery).

12. Claims 6-10, 15-17, 32-36, 57-61, 66-68, 83-87, 92-94 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo or Kondo/Bearsley or Kondo/Sato as applied to claims 1, 2, 3, 28, 29, 52, 53, 54, 78, 79, 80 above, and further in view of Berman et al. (US 5,882,251).

Referring to claims 6-10, 15, 16, 32-36 using polishing pad having grooves are well known to one skilled in the art as a way for slurry distribution and improved pad-wafer contact as shown here by Berman (col. 1, line 33-col. 2, line 20). the grooves intersect the channel on the pad (col. 2, line 5-10). the first grooves are perpendicular to the second grooves (fig. 2).

13. Claims 12-14, 18-20, 25-27, 63-65, 69-71, 89-91, 95-97 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo or Kondo/Berman as applied to claims 11, 17, 24, 62, 68, 88, 94 above, and further in view of Beardsley et al. (US 6,135,865).

Unlike claimed invention, applied prior art doesn't describe establishing the T at the contact area by heating circulating a heated fluid through the heat conductive platen or by heating or cooling the slurry before distributing it to the contact area. Vanell teaches that the chemical reactions are sensitive to the T and the reaction rate typically increases with the T. in

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the CMP, the T is held within a certain range to control the rate of reaction. he teaches of circulating fluid to heat or cool the platen to control the rate of reaction of the polishing process and also to heat the platen to ensure the chemicals in the slurry have minimum reaction rate when starting a CMP process (col. 9, line 35-col. 10, line 10). it would have been obvious at the time of the invention for one skilled in the art in light of Vanell's teaching of controlling the T of the process to heat or cool the platen and also the slurry in order control the rate of the reaction or to heat the slurry to ensure the chemicals in the slurry to have a minimum reaction when starting a CMP process.

14. Claims 22, 23, 72-74, 76, 77, 98-102 are rejected under 35 U.S.C. 103(a) as being unpatentable over Kondo as applied to claims 21, 52, 78 above, and further in view of admitted prior art.

Unlike claimed invention, Kondo doesn't describe the pressure is from about 0.10-3 or from 0.10-1 psi. he teaches a pressure of 220 g/cm<sup>2</sup> or 3.129 psi and he teaches that the down force is not limited to this (col.12, line 1-3). Furthermore using a pressure such as claimed 0.10-1 psi is well known and practiced by one skilled in the art as shown by the admitted prior art in page 5 in order to avoid disadvantage such as edge effects. Therefore, it would have been obvious to one skilled in the art at the time of the invention use low P such as 0.1-1 psi in order to avoid defects such as edge effects and scratch on the wafer.

Referring to claims 72-74, 98-100, admitted prior art shows that forming structure having less than 0.18 um and using lower dielectric constant material for isolation of these structures are desired to increase performance speed. Therefore, it would be obvious for one skilled in the art



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to apply Kondo's method to form structure having small size such as less than 0.18 um dimensions to produce a faster device.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to DuyVu n Deo whose telephone number is 703-305-0515.

DVD  
August 21, 2002



ROBERT KUNEMUND  
PRIMARY EXAMINER